

EXPLANATION OF PLATE XIV.

Fig. 1. Anterior surface of *Hornera fissurata*, Busk, drawn from calcined specimen.

2. *Idmona Meneghini*, Heller. Naples.
3. Dorsal surface (growing end) of *Hornera fissurata*, B.
4. Dorsal surface of *Hornera fissurata*, B., showing ovicell.
5. Normal ovicell of *Filisarsa irregularis*, Meneghini. Dorsal surface. Naples.
6. Short ovicell of *Filisarsa irregularis*, Menegh.
7. Section of zoecial tubes of *Hornera fissurata*, B., showing interior projections.
8. *Idmona Milneana*, d'Orb., from Capri.

Note.—I also found that in *Gephyrophora polymorpha*, B., dredged by the 'Challenger' from Simons Bay, there is an entirely concealed ovicell. It is a round sac quite free except at the border of the opening; whereas in other Chilostomata, so far as my experience goes, the wall of the ovicell is for a considerable part attached to the zoecial walls.

On the Ovicells of some *Lichenopora*.

By ARTHUR WM. WATERS, F.L.S., F.G.S.

[Read 3rd May, 1888.]

(PLATE XV.)

By *Lichenopora* I understand a genus with cancelli between the rays; but there are other discoid forms with the zoecia arranged in radial series, so that the mode of growth is common to several genera. For instance, the fossil *Actinopora regularis*, d'Orb., does not seem to have any cancelli, and I cannot agree with my friend Mr. Hincks in placing it under *Lichenopora*, but should consider it *Multitubigera*.

Dr. Jullien* would take us back to the name *Disporella* of Gray, and points out the curious mistake that was made for so many years in calling this genus *Discoporella*, Gray; whereas *Discoporella* was a name given by d'Orbigny to some Chilostomata which would now be *Cupularia* or allied genera. The genus *Lichenopora* is, however, older than Gray's, and is now well established, so that I am unable to understand why Dr. Jullien wishes us to return to *Disporella*. On the other hand, another

* Mission du Cap Horn: Bryozoaires.

recent writer, Mr. Th. Marsson*, revives *Discocavea* and *Defrancia* for *Lichenopora*, though his *Defrancia* contains species which, according to what I have said above, cannot be placed with *Lichenopora*, and his *Discocavea* is entirely based upon the radii being uniserial; but this cannot be looked upon as a generic character, and even in specific determination must not be used with too much confidence, as there are some species where the rays are in parts uniserial, in others biserial.

In some species there are spines arising from various parts of the surface of the zoarium, but these do not appear to furnish constant characters; and, further, I have on one or two occasions called attention to the great variation to which the shape of the peristome is subject in different parts of the same colony; on the other hand, which side of the peristome is prolonged seems to be of considerable diagnostic importance.

The internal "rays" in the zoœcial tubes and cancelli should be more studied, and I should consider the denticulation of recent *Heteropora cervicornis*, d'Orb. (Journ. R. Micr. Soc. vol. ii. p. 392, pl. xv. figs. 9-11), *Lichenopora bullata*, MacG., *L. echinata*, MacG., and *L. pristis*, MacG., as the equivalents of the rays with knobs in *Entalophora intricaria*, B., *Lichenopora radiata*, Aud., *L. reticulata*, MacG., *L. Holdsworthii*, B., &c.

Further, the position of the connecting-pores in the interior walls of the zoœcia should be examined.

Having seen how many of the characters used for diagnosis are variable, it is quite clear that numerous species made on account of a difference in some unimportant character can never be recognized again, making a better acquaintance with this genus very desirable; and it seems that a knowledge of the ovicells may often assist us in more fully grasping the amount of variation caused by the conditions under which the colony grew, and may show the amount of variation in different parts of a colony. We are as yet unable to say how far the ovicells may be trusted for specific determination; but there is no doubt that they are for this purpose of value. Also as some species have been described without ovicells and some with, in cases where the author has not appreciated whether they were present or not, exact studies in both conditions are required. In so recent a book as Busk's 'Catalogue of the British Museum Polyzoa,' pt. iii., where 14 species are described, the ovicells are never mentioned, nor are they in the

* Bryozoa der weissen Schreibkreide der Insel Rügen, 1887.

'Challenger' Report. A 'Challenger' specimen from Tristan da Cunha was submitted to me named *L. fimbriata*. This is *L. echinata* with an ovicell, so that the name *fimbriata* must be dropped.

The ovicells sometimes occur as inflations over the central area, as in *L. grignonensis*, B. (see Ann. Mag. Nat. Hist. ser. 5, vol. xx. pl. vii. fig. 4), *L. novæ-zelandiæ*, B., *L. wanganuiensis*, Waters (Quart. Journ. Geol. Soc. vol. xliii. p. 346), *L. Holdsworthii*, B., *L. echinata*, B.; or it may be nearer to the edge, showing the ovicellular ducts as figured by Mr. Hincks in *Lichenopora radiata*.

Although now keenly on the look-out for ovicells, it is a very difficult study, which can progress but slowly and only be done satisfactorily with ample material collected from a few localities, and one cannot help feeling despair when trying to determine the *Lichenopora*; but it is a genus which, when understood, is perhaps more likely than any other to throw light upon the Cyclostomata generally and upon some fossil forms.

LICHENOPORA CALIFORNICA, *Busk*. (Pl. XV. fig. 1.)

Unicavea californica, *d'Orb. Pal. Franç.* p. 972.

Discoporella californica, *Busk, Cat. Mar. Poly.* pt. iii. p. 32, pl. xxx. fig. 5.

Specimens from Port Western (Victoria) given to me by Miss Jelly seem to be the species described by Mr. Busk; but as *d'Orbigny's* description might apply equally well to three or four species, it seems preferable to consider Mr. Busk as the author.

The radii are usually bi- or triserial, though in parts only uniserial, and in one specimen most of the rays are uniserial and only locally biserial; the interserial spaces have round or angular cells, but when these interserial cancelli are examined at a level below the surface they are usually seen to be round. The mouths of the cells are prolonged on the distal margin, namely, the side nearest to the border of the zoarium. Zoœcial tube about 0.06 mm. wide inside. When the ovicellular cover is removed the central area is seen to have large reticulated spaces. The upper part of the ovicell is formed by a finely perforated plate extending between the rays like the cogs of a wheel. There is a thick calcareous rim at the border of this area.

The thin calcareous border of the zoarium is not shown, as this is very variable in size, and probably of no specific value.

Loc. California (*Busk*); Port Western (Victoria).

LICHENOPORA ECHINATA, *MacG.* (Pl. XV. figs. 2, 3, 6.)

Discoporella echinata, *MacG. Trans. Roy. Soc. Vict.* vol. xx. p. 127, fig. 4.

Through Miss Jelly's kindness I have been able to examine a considerable number of specimens of *Lichenopora* from Victoria, and an abundant one is, I think, the *L. echinata* of MacGillivray. The zoœcia are irregularly arranged, the peristome is much produced on the proximal edge, namely, the margin nearest to the centre of the zoarium, sometimes with one process, sometimes divided into several; numerous fine spines usually grow from the zoœcial tubes as well as from the cancelli and the surface of the ovicell. The cancelli are angular with rounded corners, though when the tube is examined at some depth below the surface it is often seen to be round, and some of the cancelli may be called round, though that is not the usual character; the entire inner surface of the cancelli is denticulate. The ovicell is formed by an inflated crust covering all the central area of the zoarium, and, as shown in figure 6, it starts from numerous places, ultimately meeting in the centre: at first this crust is very thin, but in the mature condition is deeply pitted; the surface is then somewhat ribbed and there are numerous small pores at the base of the pits. In my previous paper to this Society (p. 277) I alluded to somewhat similar pits in *Hornera*.

As soon as the growth of the ovicell commences the basal reticulated cells of the central area are covered over by a thin pellicle with several perforations to each cancellus. Both the upper and under surface of the ovicell is shown in figure 6. Figure 3 is drawn from a specimen bent up at the two sides, and it is impossible to figure it satisfactorily, as it cannot all be seen in one focus.

The opening of the ovicell is a wide tube low down at the border of the inflation, directed horizontally, much in the same way as in *L. ciliata* (Ann. Mag. Nat. Hist. ser. 5, vol. xx. p. 263, pl. vii. fig. 5); but I have only seen the one ovicell of *L. ciliata* spreading among the zoœcial tubes, and these two forms seem so closely allied that I am in doubt as to the basis of their distinction.

In some specimens the zoœcia are slightly ridged, as in *L. grignonensis*. The spines from the zoœcial tubes are not constant, sometimes occurring in great abundance, in others there are very few or they may be entirely absent. Both in this and *L. pristis*, MacG., there is a semitransparent closure with a dull opaque disk in the centre, perforated in the middle. It seems probable that *L. pristis* and *L. echinata* are only the simple and confluent colonies of the same thing.

Loc. Victoria; Tristan da Cunha ('Challenger').

LICHENOPORA VICTORIENSIS, nom. nov. (Pl. XV. fig. 4.)

Discoporella reticulata, MacGillivray, *Trans. Roy. Soc. Vict.* vol. xx. p. 126, fig. 1.

There is already *Lichenopora reticulata*, since Hagenow described a fossil as *Defrancia reticulata* (Bry. der Maast. Kreide, p. 43, pl. iv. fig. 3, non 4). Marsson has already shown that the description refers to fig. 3 and not to 4. It is possible that this may have been described under another name, but this is not certain; and I certainly cannot agree with Dr. Pergens, who would call it *diadema*, uniting the *Defrancia disticha*, Hag., *D. diadema*, Gold., and *D. reticulata*, Hag.

As Mr. MacGillivray describes it from Victoria, I would suggest the name *L. victoriensis*.

This is one of those species in which without the ovicellular ducts it would be difficult to say whether there was an ovicell or not. The central area is covered by the ovicell, the covering of which is formed by large raised trabeculæ, within which there is a smaller reticulation formed by similar trabeculæ. There are spines with knobs from the walls of the trabeculæ, similar to those I described in *Lichenopora grignonensis* (Ann. Mag. Nat. Hist. ser. 5, vol. xx. p. 262, pl. vii. fig. 4). In the present case I have only figured a few of these spines, not to complicate the figure too much. The spaces between the trabeculæ are filled in with a perforated cover. Aperture of zoœcial tubes about 0.06 mm. wide.

Loc. Victoria (*MacG.*); Port Stephens, 5-6 fath., New South Wales.

DISCOTUBIGERA? LINEATA, *MacG.* (Pl. XV. fig. 5.)

Diastopora lineata, MacGillivray, *Trans. Roy. Soc. Vict.* vol. xxi. p. 96, pl. iii. fig. 1.

Liripora lineata, MacG. *Cat. Mar. Polyzoa of Vict.*, *Roy. Soc. Vict.* 1887, p. 32.

Discotubigera lineata, Waters, *Ann. Mag. Nat. Hist.* ser. 5, vol. xx. p. 260, pl. vi. fig. 24.

I have already (*loc. cit.*) alluded to the ovicell, but it has never been figured, and therefore I add a figure of an ovicell occurring near the border of the zoarium. It will be seen that it is of a type quite different from that of *Lichenopora*; but as yet we are in ignorance concerning the ovicells of *Discotubigera* and its allies.

LICHENOPORA HOLDSWORTHII, *Busk*. (Pl. XV. figs. 7 & 8.)

Discoporella Holdsworthii, *Busk*, *Cat. Mar. Polyzoa*, pt. iii. p. 33, pl. xxx. fig. 4.

Lichenopora Holdsworthii, *Waters*, *Quart. Journ. Geol. Soc.* vol. xliii. p. 347; *Ann. Mag. Nat. Hist.* ser. 5, vol. xx. p. 261.

I have already (*Quart. Journ. Geol. Soc.* xliii. p. 347, and elsewhere) alluded to the "rays" in the zoecial tubes and cancelli, and to Mr. Busk perhaps referring to these when he speaks of stellate pores

The ovicell occurs as a central inflation with large roundish depressions closed with a perforated pellicle. It spreads in between the radii in somewhat the same manner as in *L. californica* though not so marked on the surface. I have only seen the one ovicell; and if this was the only specimen of *L. Holdsworthii* known, I doubt if it would be possible without breaking up the specimen to decide whether there was an ovicell.

Loc. Living: Ceylon; Victoria; 'Challenger' station 142 (S. Africa). Fossil: Waipukurau (New Zealand).

EXPLANATION OF PLATE XV.

- Fig. 1. *Lichenopora californica*, *Busk*. Showing ovicell extending between the radii. From Port Western (Victoria). $\times 12$.
2. Cancellus of *L. echinata* showing denticles. $\times 85$.
3. *Lichenopora echinata*, *MacG.* Shows to the left the lower surface of the ovicell formed by reticulated cells covered with a pellicle. The upper surface is pitted. $\times 25$.
4. *Lichenopora victoriensis*. Shows ovicell and two ovicellular ducts. From Port Stephens, 5-6 fath. (New South Wales). $\times 25$.
5. *Discotubigera lineata*, *MacG.* Shows the ovicell at the border of the colony, and also the ovicellular duct. From Port Jackson (New South Wales). $\times 25$.
6. *Lichenopora echinata*. Shows the formation of the ovicell which starts from several points to meet over the centre. From Port Phillip. $\times 12$.
7. Cancellus of *L. Holdsworthii*, showing rays. $\times 85$.
8. *Lichenopora Holdsworthii*, *B.*, with ovicell. From Port Phillip. $\times 25$.

Researches into the Life-histories of *Glyciphagus domesticus* and *G. spinipes*. By A. D. MICHAEL, F.L.S., F.Z.S., F.R.M.S.

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(PLATE XVI.)

FOR over three years last passed I have been, as opportunity offered, endeavouring to elucidate certain obscure points which I had observed in the post-embryonic development of the common

